**20SH2101 – ENGINEERING MATHEMATICS-III**

(Common to ECE, MECH, EEE & CE)

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| **Course category:** | Basic Sciences | **Credits:** | 3 |
| **Course Type:** | Theory | **Lecture - Tutorial - Practical:** | 2 - 1 – 0 |
| **Prerequisite:** | Intermediate Mathematics | **Sessional Evaluation :**  **External Evaluation:**  **Total Marks:** | 40  60  100 |

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| **Course**  **Objectives** | Students undergoing this course are expected to understand: | |
| 1. The basic concepts of numerical solutions of simultaneous linear and non-linear algebraic equations. 2. The numerical methods to solve Ordinary Differential Equations by using Taylor’s series method, Picard’s method, Euler’s and Modified Euler’s Methods and Runge-Kutta methods of 2nd and 4th order. 3. The concepts of Cauchy - Riemann equations, Construction of Analytic function, Line integral, Cauchy’s theorem and Cauchy’s integral formula. 4. The concepts of Residues. 5. The Properties of Z**-** Transforms, shifting properties, initial value and final value theorems and the applications of difference equations. 6. Foundation of the probability and statistical methods. | |
| **Course Outcomes** | Upon successful completion of the course, the students will be able to: | |
| CO1 | Have a sound knowledge in analyzing the simultaneous linear and non-linear algebraic equations by various numerical methods. |
| CO2 | Understand effectively the significance numerical methods to solve Ordinary Differential Equations. |
| CO3 | Understand effectively the significance of differentiability for complex functions and be familiar with the Cauchy-Riemann equations and also Cauchy’s integral formula. |
| CO4 | Compute the Taylor and Laurent expansions of simple functions, determining the nature of the singularities and calculating residues. |
| CO5 | Attains skills in analyzing the Z**-**Transforms and their applications. |
| CO6 | Have a well-founded knowledge of standard distributions (Binomial, Poisson and Normal distributions) which can describe real life phenomena. |
| **Course**  **Content**  **Course**  **Content** | **UNIT - I**  **SOLUTION OF SIMULTANEOUS LINEAR AND NON-LINEAR ALGEBRAIC EQUATIONS:** Iteration method, Gauss Jordon method, Gauss Elimination with Pivotal condensation method, Triangular Factorization method, Gauss-Seidal method and Newton-Raphson method  **UNIT - II**  **NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS:** Solution by Taylor’s Series, Picard’s Method of Successive Approximations, Euler’s Methods and Runge-Kutta Method of 2nd order and 4th order.  **UNIT-III**  **COMPLEX ANALYSIS:** Analytical functions, Cauchy - Riemann equations, Construction of Analytic function, Complex integration - Line integral, Cauchy’s theorem, Cauchy’s integral formula and Generalized Cauchy’s integral formula.  **UNIT-IV**  **RESIDUES**: Taylor’s theorem and Laurent’s theorem (without proof), Singularities, Poles, Residues, Residue theorem and Evaluation of real definite integrals.  **UNIT-V**  **Z-Transforms:** Z**-**Transform of some standard functions, Properties of Z**-**Transforms, Shifting Properties, Initial value theorem and final value theorem, Inverse Z-Transform, Convolution theorem, Inversion by partial fractions and Applications to difference equations.  **UNIT-VI**  **PROBABILITY AND STATISTICS**: Introduction, Random variables, Discrete and Continuous distributions, Binomial distribution, Poisson distribution and Normal distribution.  **COMPLEX ANALYSIS:** Analytical functions, Cauchy - Riemann equations, Construction of Analytic function, Complex integration - Line integral, Cauchy’s theorem, Cauchy’s integral formula and Generalized Cauchy’s integral formula. | |
| **Text Books and Reference Books** | **TEXT BOOKS:**   1. Higher Engineering Mathematics - B.S. Grewal, Khanna Publishers, New Delhi. 2. Engineering Mathematics - B.V. Ramana, Tata McGraw-Hill Education Pvt. Ltd, New Delhi 3. Advanced Engineering Mathematics - Erwin Kreyszig, Wiley, India   **REFERENCES:**   1. Higher Engineering Mathematics - H.K. Dass, Er. Rajnish Verma, S. Chand Publication, New Delhi. 2. Engineering Mathematics -III - Dr.T.K.V. Iyengar, Dr.B. Krishna Gandhi, S. Ranganatham, Dr.M.V.S.S.N. Prasad, S. Chand Publication, New Delhi 3. Special functions and complex variables (Engineering Mathematics-III) – Shahnaz Bathul, PHI, New Delhi. | |

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| **Contribution of Course Outcomes towards achievement of Program Outcomes**(3-High, 2-Medium, 1-Low) | | | | | | | | | | | | | | |
|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
| CO1 | 3 | 3 | 2 | 2 | 1 | - | - | - | - | - | - | 2 | - | - |
| CO2 | 3 | 3 | 2 | 2 | 1 | - | - | - | - | - | - | 2 | - | - |
| CO3 | 3 | 3 | 3 | 1 | 1 | - | - | - | - | - | - | 2 | - | - |
| CO4 | 3 | 3 | 2 | 2 | 1 | - | - | - | - | - | - | 2 | - | - |
| CO5 | 3 | 3 | 2 | 2 | 1 | - | - | - | - | - | - | 2 | - | - |
| CO6 | 3 | 3 | 2 | 2 | 1 | - | - | - | - | - | - | 2 | - | - |